

Mealworm Experiment

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In science class, I did a partner experiment on mealworms. However, the results were not conclusive and I decided to do it again at home by myself. In the experiment, I targeted to find out how the worms would adapt to their surroundings. I experimented with three different variables; light, dampness and food.

Background Information:

To hide from their enemies and for food, mealworms are usually found under logs, rocks, in sacks of grain, or even in burrows of other animals who are not their enemy. Mealworms prefer darkness and to have their body in contact with an object. When in captivity, mealworms feed on oat, corn meal and oat meal. Sometimes a slice of fruit or vegetable is given mainly to provide hydration for the mealworms. However, the fruit or vegetable has to be discarded after a couple of days to prevent mould and decay as these can be harmful to the mealworms. Furthermore, excessive moisture may kill the mealworms.

My aim is to investigate how the factors of light, dampness and food affect the reaction of the worm. The first experiment had the environment of different amounts of light, the second experiment had the environment different types of food and the third experiment had the environment of different amounts of dampness.

In this experiment, there are three hypotheses.

1. When the light increases, the worms are expected to move towards the dark area. This is because the worms would feel the intense light and move out of the light area.
2. When the amount of liquid and flesh in the type of food increases, the worms would be expected to prefer this type of food. This is because the worm should always be looking for food to hydrate and feed itself in order to get ready for the pupa stage.
2. As the dampness increases, the worms are expected to move to the dampest area. This is because the worms would be able to hydrate themselves whenever they want.

The independent variable = the set of worms, the amounts of light, the amount of dampness and the different types of food.

For each trial, I changed the set of twenty worms to see if my results were all roughly the same. I changed the amount of light by using different materials to cover the box that each let in a different amount of light. It also made sure the room was dark when I did the experiment so that the torchlight will be effective. For the food experiment, I collected the four different types of food and placed them equally spaced apart. In the dampness experiment, there are three amounts of dampness. A soaking wet area, a damp area and a dry area. To create the damp area, I wet the tissue and let it dry for twenty minutes. To create the soaking area, I ran the tissue under the tap and put it directly into the clear container.

Light experiment

Type of material	Amount of light
None	Very Strong
White paper	Dim
black cardboard paper	None

Food Experiment

Amount of food	Type of food
Slice of apple	Apple
Slice of carrot	Carrot
1 potato chip	Potato Chip
1 teaspoon of flour	Flour

Dampness experiment

Material used	Amount of dampness
Soaking wet tissue	Soaking Wet
Soaking wet tissue dried for 20 minutes	Damp
Dry tissue	Dry

The dependent variable = how many worms went to each area.

During each of the trials, there were always 20 worms in the container. I counted how many worms went to each area. For example, in the food experiment, I counted how many of the 20 worms were around the apple, flour, carrot or potato chip.

The controlled variable = 1) the temperature in the room.
2) amount of time for each experiment.
3) the number of worms in each trial

The temperature in the room is one of the controlled variables because it could affect the actions of the mealworm. The temperature in the room for all three experiments was around 24 °C. We gave the mealworms 10 minutes in every experiment so that the results would be fair. I used a total number of twenty worms in each trial. If the number of worms was not a controlled variable, we would not be able to compare the results.

There were many apparatus used in this experiment.

- * a clear container (22 cm by 15 cm) - to carry out experiments
- * a torchlight - source of light
- * a retort stand - for securing the torchlight at the same height
- * a box of mealworms - what we are observing
- * black paper - to cover half the box in light experiment
- * tape - to secure black paper around box.
- * kitchen towel - to wet and use for damp area
- * water - to wet kitchen towel
- * apple - used in food experiment
- * carrot - used in food experiment
- * potato chip - used in food experiment
- * 1 tablespoon of flour - used in food experiment
- * stopwatch - to time 10 minutes for each trial

Method:

Light vs darkness experiment

Firstly, I went into a dark room to carry out the experiment so that the light would have a bigger effect on the mealworms. Then, I got a black piece of cardboard paper, and used it to cover a third of the top of the container, creating the dark area. Secondly, I used a white piece of paper to cover the top of the middle third of the container, creating the dim light area. I left the last third open so that the light would be more intense. Thirdly, I set up the retort stand, secured the torchlight, and put the container under the light. Fourthly, I counted out 20 worms and place them in the middle of the dim of area. Fifthly, I started my

stopwatch. After 10 minutes, I recorded my observations, and returned the worms into the box. I then repeated steps four to five two more times using a different set of 20 worms.

Food experiment

Firstly, I cut two thin slices of apple and carrot, measured out one tablespoon of flour, took out one potato chip and placed them in the corners of the clear container. Secondly, I counted out twenty worms and placed them in the middle of the container. Thirdly, I started my stopwatch. After 10 minutes, I recorded my observations and returned the worms into the box. I then repeated steps two and three two more times using a different set of worms.

Dampness vs dryness experiment

Firstly, I tore off a piece of kitchen towel and used it to cover a third of the base. Secondly, I got another piece of kitchen towel and wet it. After letting it dry for 20 minutes, I used it to cover a third of the base of the container. Thirdly, I wet a tissue and used it to cover the last third of the container. Fourthly, I counted out twenty worms and placed them in the middle of the container. Fifthly, I started my stopwatch. After 10 minutes had passed, I recorded my observations and put the worms back in the box. I repeated steps four to five two more times using different sets of worms.

Results

Light vs darkness experiment

This graph shows the amount of worms that went to each area in the light experiment.

	Trial 1	Trial 2	Trial 3	Average
No. of worms in dark area	11 worms	13 worms	14 worms	12.7 worms
No. of worms in dim light area	5 worms	6 worms	3 worms	4.7 worms
No. of worms in light area	4 worms	1 worm	3 worms	2.7 worms

Food experiment

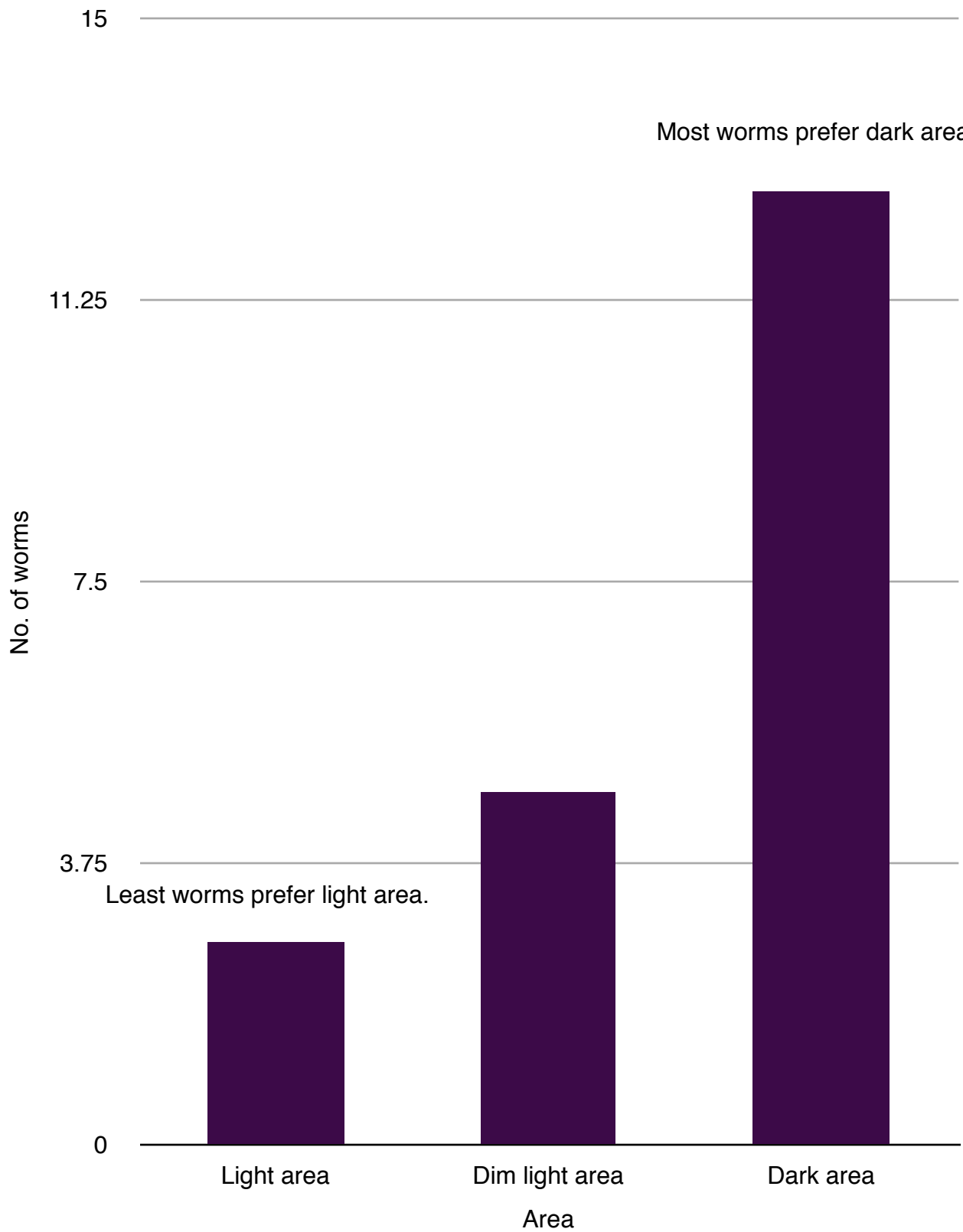
This table shows the number of worms that went to each area in the food experiment.

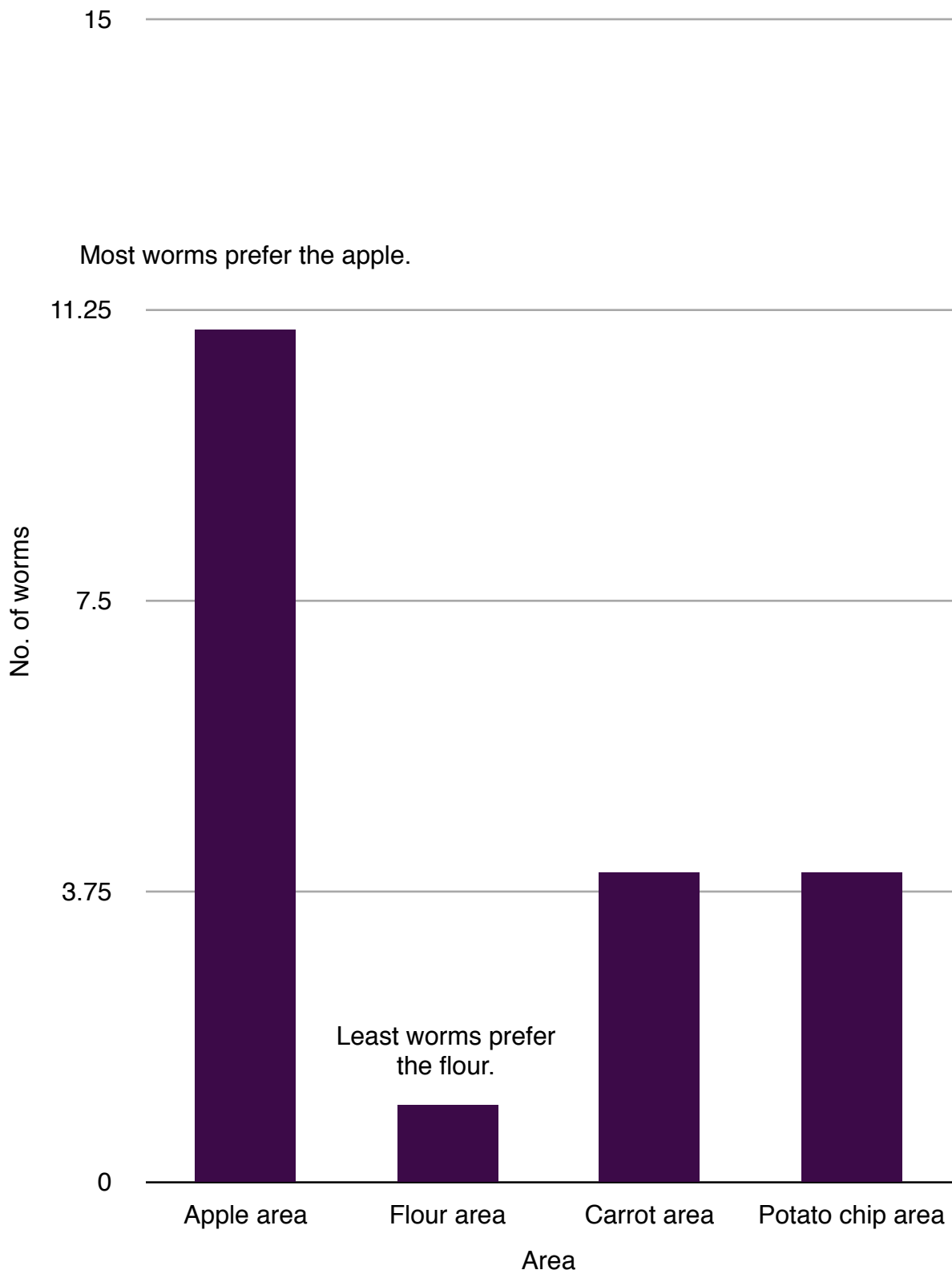
	Trial 1	Trial 2	Trial 3	Average
No. of worms around apple	11 worms	11 worms	10 worms	10.7 worms
No. of worms around carrot	3 worms	4 worms	4 worms	3.7 worms
No. of worms in flour	2 worms	0 worms	2 worms	1.3 worms
No. of worms around potato chip	4 worms	5 worms	4 worms	4.3 worms

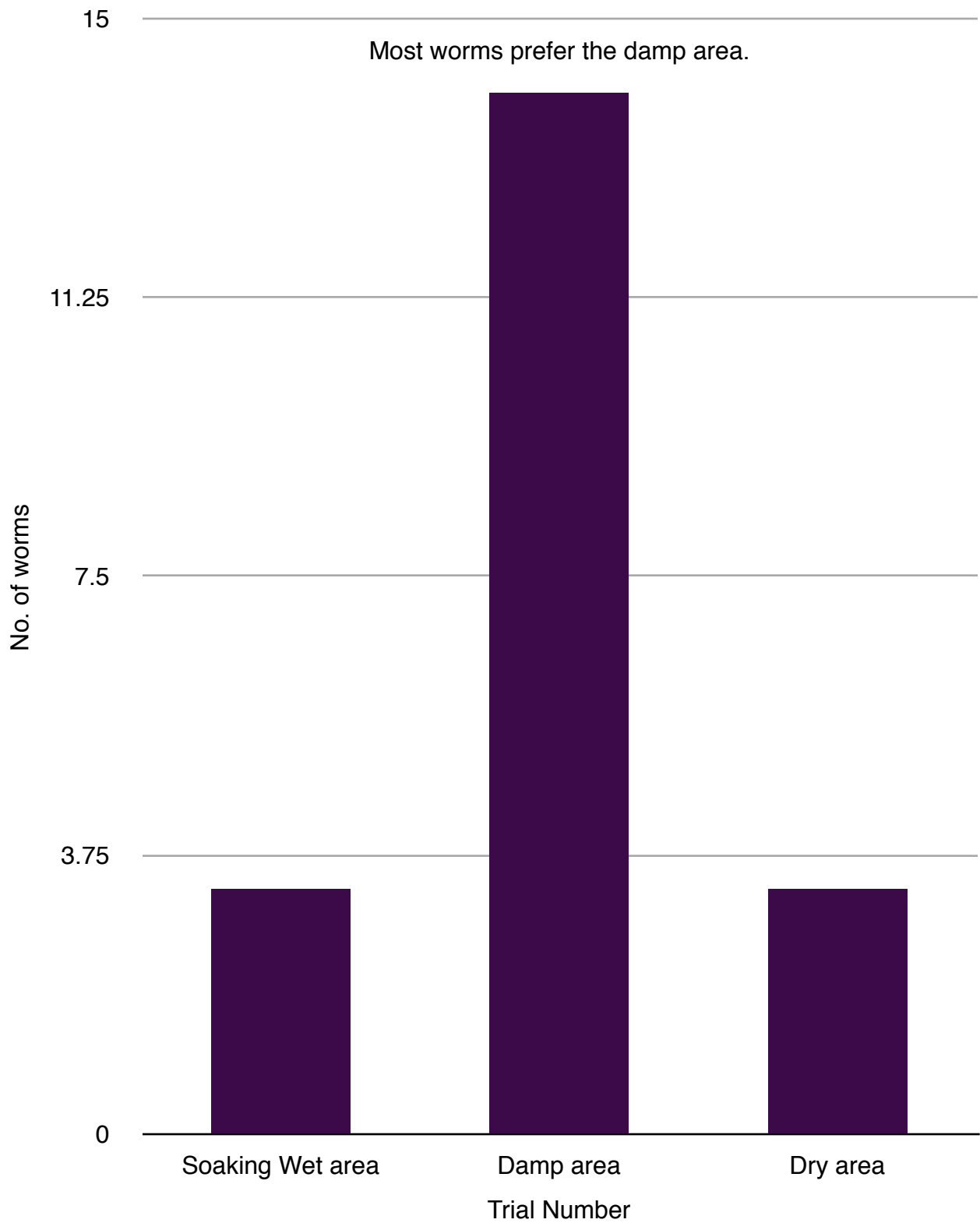
Dampness vs dryness experiment

This table shows the amount of worms that went to each area in the dampness experiment.

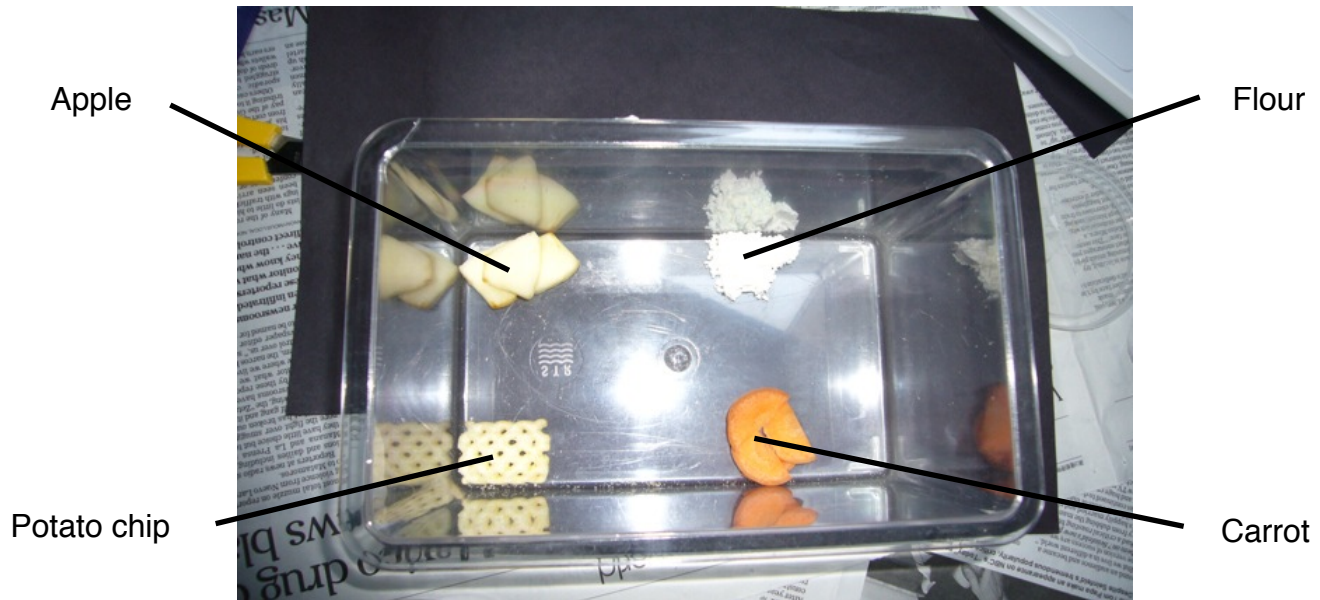
	Trial 1	Trial 2	Trial 3	Average
No. of worms in soaking wet area	2 worms	5 worms	3 worms	3.3 worms
No. of worms in damp area	15 worms	13 worms	14 worms	14 worms
No. of worms in dry area	3 worms	4 worms	3 worms	3.3 worms

Average results for light experiment

Average results for food experiment**Graph 2**

Average results for dampness experiment***Graph 3***

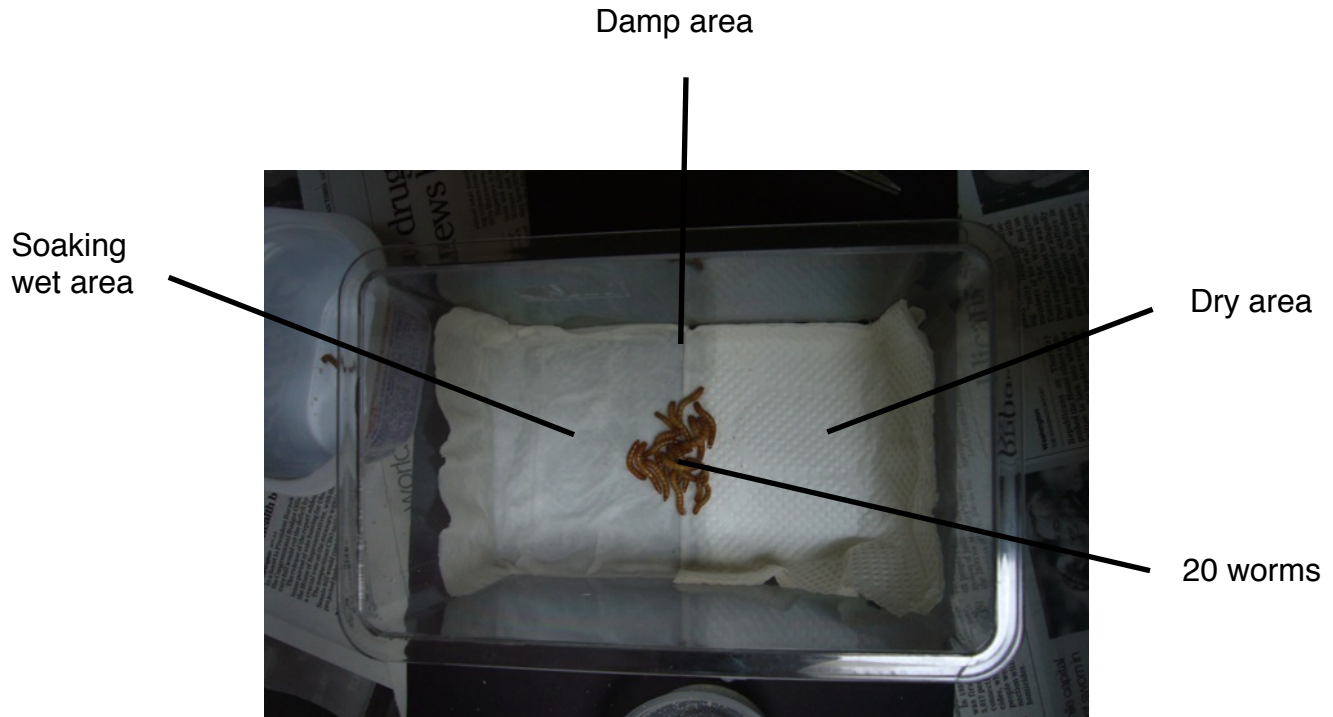
Photos



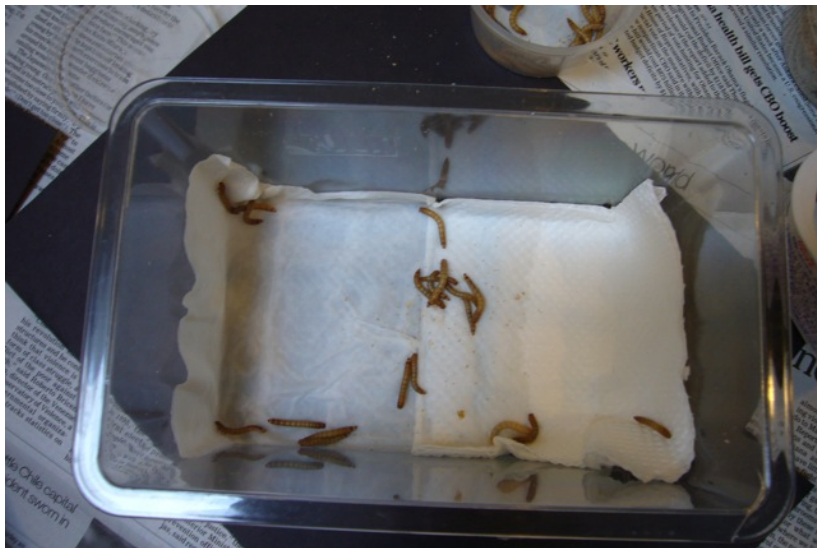
This is the set up for the food experiment



This picture shows the worms adapting to their environments by deciding which food would be most nutritious for them



This picture shows when the worms had just been placed into the environment with three different amounts of dampness



This picture shows the 20 worms adapting to their environment by choosing which area would be most appropriate for them.

Conclusion

My hypothesis was proven right by the results of the light vs darkness experiment. **Graph 1** shows that the worms prefer darkness over light. This could be because they feel more safe instead of being out in the open where their predators could attack them. Generally, worms like to hide under logs and rocks. This could also explain their preference of darkness.

From **graph 2**, I know that mealworms favorite food over apples, carrots, potato chips and flour is apples. I think that the mealworms prefer the apple because they can hydrate themselves with the juice and feed on the flesh of the apple. The carrot should also be an acceptable choice but maybe the piece i had was not as juicy as the slice of apple. If I were to do further experiments to prove that the worms like food that they can use to hydrate themselves, I would do the experiment again with four types of food that has juice in it and observe the results.

The results from the dampness experiment (**graph 3**) shows that the mealworms like dampness over dryness. I think that the mealworms like the dampness because just like the apples, it provides them with moisture. However, the experiment was conducted over a period of 10 minutes and should the mealworms be allowed to remain on the damp surface for excessive amounts of time, I feel it would become harmful to the mealworms as mould and decay may set in.

Evaluation

If I had a chance to do any of these experiments again, I would choose to go more into depth for the dampness experiment. I would hold the experiment for a longer time period so that I can prove that if the mealworms were allowed to remain on the damp surface for excessive amount of time, the amount of dampness would become harmful to the mealworms as their bodies might start to rot and get infected. If I were to do the food experiment again, I would worms in the soil before putting the food into the container. I would do this because when I gave the worms a thin slice of apple (not part of experiment), they all came up to the surface of the soil to eat the apple. I could tell that the worms ate the apple because on the next day, only the skin of the apple was left. Another thing that I would do is measure the same amount of food by weighing the same amount of them. This may affect the results because if the amount of each type of food is different, one of the food may have a stronger smell than the others.

In the earlier experiment, I had trouble putting the information that I collected into a graph. I corrected this mistake by making sure the information I was planning to collect was relevant and enough to make a graph before the experiment was carried out.